PROJECT facts

U.S. DEPARTMENT OF ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

Gasification TECHNOLOGIES

05/2000

WILSONVILLE POWER SYSTEMS DEVELOPMENT FACILITY

PRIMARY PARTNER

Southern Company Services
Birmingham, AL

MAIN SITE

Wilsonville Power Systems Development Facility
Wilsonville, AL

TOTAL ESTIMATED COST

(1990-2002) $277,200,000

COST SHARING

(1990-2002)

DOE	$233,300,000
Non-DOE	$ 43,900,000

Description

The Wilsonville Power Systems Development Facility (PSDF) is the focal point for much of the Nation's advanced electric power technology development in the latter 1990s and into the 21st century.

Jointly sponsored by many of the Nation's most forward-looking power equipment developers, the facility is a highly flexible test center. Private developers are able to test innovative electric power system components — new combustors, improved cleanup systems, and advanced turbines and fuel cells — at a central location, saving the time and expense of building separate test facilities.

The facility contains four technologies: (1) an advanced pressurized fluidized-bed combustor (PFBC) system (an extremely clean method for burning coal), (2) a trans-port reactor gas source (an efficient type of coal gasifier/combustor), (3) particulate control devices (PCDs) (to test filters for removing tiny particles from coal gases), and (4) an advanced topping combustor/gas turbine. An advanced fuel cell may be added in the future.

Combining these technologies into a single structure saved more than $32 million compared with the cost of building stand-alone facilities.

Status

The transport reactor was successfully operated on coal in August 1996. Tests have been completed in the pressurized combustion mode and the transport reactor has been converted to gasification. Particulate removal to date has been with the Westinghouse filter vessel using a variety of candle filters. Construction of the advanced Foster Wheeler PFBC is complete and shakedown testing has begun.

Goal

DOE's goal is to develop power systems that are much more efficient and at least 10 times cleaner than today's standards by the year 2010. The Wilsonville PSDF will serve as the proving ground for many new Advanced Power Systems and Vision 21 Technologies. The goal of the Wilsonville PSDF is to perform integrated system and component testing at an industrially relevant scale of operation via a government/industry partnership.

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Wilsonville Power Systems Development Facility

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PROJECT PARTNERS

Kellogg Brown & Root
Houston, TX (transport reactor)

Foster Wheeler Development Corporation
Perryville, NJ (advanced PFBC)

Southern Research Institute
Birmingham, AL
(particulate sampling)

Siemens-Westinghouse Power Corporation
Orlando, FL
(low NO_x topping combustor)

Siemens-Westinghouse Science and Technology Center
Pittsburgh, PA
(particulate filters)

Combustion Power Corporation
Menlo Park, CA
(particulate filters)

Rolls Royce-Allison Engine Company
Indianapolis, IN (gas turbines)

Peabody Coal Company
St. Louis, MO (cofunding)

EPRI
Palo Alto, CA (cofunding)

Benefits

The Wilsonville Power Systems Development Facility gives U.S. industry the world's most cost-effective, flexible test center for testing tomorrow's coal-based power-generating equipment. It is one of the highest priorities in the Department of Energy's advanced power systems development effort.

Coal will supply at least half the Nation's electricity well into the 21st century (it currently accounts for 56%). Yet, future coal systems will have to be increasingly clean and more efficient if the United States is to use its most abundant fossil fuel to sustain economic growth.

The Power Systems Development Facility is designed to be the Nation's test center for evaluating the critical components of these future, coal-based power systems. For example, at the facility:

- The transport reactor will test advanced, high-efficiency gasification and combustion methods which will lead to less CO_2 and other pollutant emissions per pound of coal burned.
- The pressurized fluidized-bed combustor will test a new, higher efficiency method for burning coal that reduces sulfur, nitrogen and CO_2 emissions.
- The particulate control module will test a variety of filters developed by private firms for removing particles to reduce emissions and prevent damage to downstream power equipment. Such filters will be crucial to future coal-based, high-efficiency power plants.

Hardware systems can first be evaluated separately, then linked together in an integrated power system. Filters can be tested with a pressurized fluidized-bed combustor or with a coal gasifier. Advanced turbines and fuel cells can be tied into the process path.

The result is a national test center where utilities and other members of the power industry can evaluate new concepts for advanced power plants. Capable of operating at pilot to near-demonstration scales, the facility is large enough to give industry real-life data, yet small enough to be cost-effective and adaptable to a variety of industry needs.

Project 003 05/2000